

I CLAIM:

1. A method of tracking the position of an imaging head of a catheter in three-dimensional space within a human body, the method comprising:

receiving a first image captured by the catheter;

5 receiving a second image captured by the catheter;

comparing the first and second images to determine first correlation loss data between the first and second images;

determining first position data for the second image, relative to the first image, using the first correlation loss data; and

10 outputting the first position data.

2. The method of claim 1, wherein determining first position data for the second image comprises determining a first angle of separation between the first and second images using the first correlation loss data, and determining first position data for the second image, relative to the first image, using the first angle of separation.

15 3. The method of claim 1, further comprising:

comparing the first and second images to determine second correlation loss data between the first and second images;

determining second position data for the second image, relative to the first image, using the second angle of separation; and

20 outputting the second position data.

4. The method of claim 3, wherein determining second position data for the second image comprises determining a second angle of separation between the first and second images using

the second correlation loss data, and determining second position data for the second image, relative to the first image, using the second angle of separation.

5. The method of claim 3, wherein the first and second correlation loss data measure correlation loss in different directions.
- 5 6. The method of claim 3, wherein the first image comprises a first plane and the second image comprises a second plane.
7. The method of claim 6, wherein the first position data comprises a first line in three dimensions in the second plane and the second position data comprises a second line in three dimensions in the second plane, and wherein the first position data and the second position data 10 define a position of the second plane in three dimensions.
8. The method of claim 1, wherein the first image comprises a first plane and the second image comprises a second plane.
9. The method of claim 8, wherein the first position data comprises a first line in three dimensions in the second plane.
- 15 10. The method of claim 1, wherein the first image comprises a first data location and the second image comprises a second data location corresponding to the first data location, and wherein determining first correlation loss data comprises determining a difference in an image property between first image data stored in the first data location and second image data stored in the second data location.

11. The method of claim 10, wherein the image property comprises one or more of density, color, hue, saturation, or reflectivity.
12. The method of claim 10, wherein determining first correlation loss data further comprises repeating the determination for a plurality of data locations situated along a line in the first image
5 and a corresponding line in the second image.
13. The method of claim 12, wherein the corresponding line in the second image is a projection onto the second image of the line in the first image.
14. A computer-useable medium, the medium comprising a sequence of instructions which, when executed by a processor, causes the processor to execute a method of tracking the position
10 of an imaging head of a catheter within a human body, the method comprising:
 - receiving a first image captured by the catheter;
 - receiving a second image captured by the catheter;
 - comparing the first and second images to determine first correlation loss data between the first and second images;
 - 15 determining first position data for the second image, relative to the first image, using the first correlation loss data; and
 - outputting the first position data.
15. The computer-useable medium of claim 15, wherein determining first position data for the second image comprises determining a first angle of separation between the first and second images using the first correlation loss data, and determining first position data for the second image, relative to the first image, using the first angle of separation.
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16. The computer-useable medium of claim 15, wherein the method further comprises:
 - comparing the first and second images to determine second correlation loss data between the first and second images;
 - determining second position data for the second image, relative to the first image, using the second angle of separation; and
 - outputting the second position data.
17. The computer-useable medium of claim 16, wherein determining second position data for the second image comprises determining a second angle of separation between the first and second images using the second correlation loss data, and determining second position data for the second image, relative to the first image, using the second angle of separation.
18. The computer-useable medium of claim 16, wherein the first and second correlation loss data measure correlation loss in different directions.
19. The computer-useable medium of claim 16, wherein the first image comprises a first plane and the second image comprises a second plane.
- 15 20. The computer-useable medium of claim 19, wherein the first position data comprises a first line in three dimensions in the second plane and the second position data comprises a second line in three dimensions in the second plane, and wherein the first position data and the second position data define a position of the second plane in three dimensions.
21. The computer-useable medium of claim 14, wherein the first image comprises a first plane and the second image comprises a second plane.

22. The computer-useable medium of claim 21, wherein the first position data comprises a first line in three dimensions in the second plane.
23. The computer-useable medium of claim 14, wherein the first image comprises a first data location and the second image comprises a second data location corresponding to the first data location, and wherein determining first correlation loss data comprises determining a difference in an image property between first image data stored in the first data location and second image data stored in the second data location.
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24. The computer-useable medium of claim 23, wherein the image property comprises one or more of density, color, hue, saturation, or reflectivity.
- 10 25. The computer-useable medium of claim 23, wherein determining first correlation loss data further comprises repeating the determination for a plurality of data locations situated along a line in the first image and a corresponding line in the second image.
26. The computer-useable medium of claim 25, wherein the corresponding line in the second image is a projection onto the second image of the line in the first image.
- 15 27. A system for mapping a lumen in a patient, comprising:
 - an imaging catheter adapted to capture a plurality of images of the lumen;
 - a computer adapted to receive the captured plurality of images and create a map of the lumen by determining a position in three dimensions of each of the plurality of images using data contained in the images; and
- 20 an output device adapted to output the map of the lumen.
28. The system of claim 27, wherein the output device comprises a video display.

29. The system of claim 27, wherein the computer determines the position of one of the plurality of images by comparing the image with a reference image whose position is known.
30. The system of claim 29, wherein the system is initialized by arbitrarily defining the position of the reference image.
- 5 31. The system of claim 27, wherein the position of the reference image is known based on a prior determination of the position by the computer.